CLAIMS

1. An acrylic fiber

(a) consisting of an acrylonitrile polymer comprising an acrylonitrile unit in at least 80 wt% and less than 95 wt%,

(b) having a monofilament dry strength of 2.5 to 4.0 cN/dtex,

(c) having a monofilament dry elongation of 35 to 50 %, and

(d) forming a crack with a length of 20 μm or more in its tension rupture lateral surface along the filament axis direction when rupturing the monofilament in a tension test.

2. The acrylic fiber as claimed in Claim 1 where a long/short axis ratio in the fiber cross section is 1.0 to 2.0.

3. An acrylic fiber

(a) comprising corrugations on its surface,

(b) having an average tilt angle of 15 to 20 ° between two adjacent corrugations in a cross section vertical to the fiber axis direction,

(c) having a maximum level difference of 0.15 to 0.35 μm between the bottom and the top of the corrugations, and

(d) exhibiting a luster of 10 to 20 % in a luster determination method for a 45 ° mirror surface for a fiber bundle surface.

4. The acrylic fiber as claimed in Claim 3, further

(e) consisting of an acrylonitrile polymer comprising an acrylonitrile unit in at least 80 wt% and less than 95 wt%,

(f) having a monofilament dry strength of 2.0 to 4.0 cN/dtex,

(g) having a monofilament dry elongation of 15 to 40 %, and

(h) forming a crack with a length of 20 μm or more in its tension rupture lateral surface along the filament axis direction when rupturing the monofilament in a tension test.

5. The acrylic fiber as claimed in Claim 3 where a long/short axis ratio in the fiber cross section is 5 to 15.

6. The acrylic fiber as claimed in Claim 4 where a long/short axis ratio in the fiber cross section is 5 to 15.

7. An acrylic fiber

(a) comprising a plurality of flat arms radially extending from a center along a longitudinal direction and

(b) forming a crack with a length of 200 μm or more in the center of its tension rupture lateral surface along the filament axis direction when rupturing the monofilament in a tension test.

8. The acrylic fiber as claimed in Claim 7, further

(c) consisting of an acrylonitrile polymer comprising an

acrylonitrile unit in at least 80 wt% and less than 95 wt%,

(d) having a monofilament dry strength of 2.0 to 4.0 cN/dtex, and

(e) having a monofilament dry elongation of 15 to 40 %.

9. The acrylic fiber as claimed in Claim 7 where a Young's modulus is 5800 N/mm^2 or higher.

10. The acrylic fiber as claimed in Claim 8 where a Young's modulus is 5800 N/mm^2 or higher.

11. The acrylic fiber as claimed in Claim 7 where a ratio of a/b is 2.0 to 10.0, wherein "a" and " b" are the monofilament length from its center to the tip of the flat arm and the width of the flat arm, respectively.

12. The acrylic fiber as claimed in Claim 8 where a ratio of a/b is 2.0 to 10.0, wherein "a" and " b" are the monofilament length from its center to the tip of the flat arm and the width of the flat arm, respectively.

13. A process for manufacturing an acrylic fiber comprising the steps of:

discharging a spinning feed solution comprising an acrylonitrile polymer comprising 80 wt% or more and less than 95 wt% of acrylonitrile unit in an organic solvent, into the first

coagulation bath consisting of an aqueous organic solvent solution at 30 to 50 °C containing 20 to 70 wt% of an organic solvent which may be the same as or different from the organic solvent for the spinning feed solution, to form a coagulated filament;

drawing the filament from the first coagulation bath at a rate of 0.3 to 2.0 times of the discharge linear velocity of the spinning feed solution;

stretching the filament by 1.1 to 2.0 times in the second coagulation bath consisting of an aqueous organic solvent solution at 30 to 50 °C containing 20 to 70 wt% of an organic solvent which may be the same as or different from any of the two organic solvents; and

subsequently conducting wet heat stretching of the filament by three times or more.

14. The manufacturing process as claimed in Claim 13 where

the concentration of the organic solvent in the first coagulation bath is 40 to 70 wt%; the drawing rate of a coagulated filament from the first coagulation bath is 0.3 to 0.6 times of the discharge linear velocity of the spinning feed solution; and

the concentration of the organic solvent in the second coagulation bath is 40 to 70 wt%.

15. The manufacturing process as claimed in Claim 13 where

the concentration of the organic solvent in the first

coagulation bath is 20 to 60 wt%; the drawing rate of a coagulated filament from the first coagulation bath is 0.6 to 2.0 times of the discharge linear velocity of the spinning feed solution; and

the concentration of the organic solvent in the second coagulation bath is 20 to 60 wt%.

16. The manufacturing process as claimed in Claim 13 where the organic solvents in the spinning feed solution, the first coagulation bath and the second coagulation bath are dimethylacetamide and

the first and the second coagulation bathes are essentially at the same temperature and have essentially the same composition.

17. The manufacturing process as claimed in Claim 14 where the first and the second coagulation bathes are at the same temperature and have the same composition, and that a coordinate (X,Y) is within the area delimited by the lines represented by the following equations (1) to (3):

$$Y=-X+105 \quad \text{(Eq.1)}$$

$$Y=-(1/2)X+77.5 \quad \text{(Eq.2)}$$

$$Y=-4X+315 \quad \text{(Eq.3)}$$

wherein Y is the coagulation-bath temperature (°C) and X is the concentration of the organic solvent (wt%).

18. The manufacturing process as claimed in Claim 15 where

a spinneret used comprises an orifice hole having a ratio A/B of 2.0 to 10.0, wherein "A" and "B" are the length of each radially branched opening arm from its center to its tip and the width of the branched opening arm, respectively.

19. The manufacturing process as claimed in Claim 15 where a spinneret used comprises an orifice hole with an flatness of 5.0 to 15.0.

20. The manufacturing process as claimed in Claim 13 where a fiber after stretching and before drying has a degree of swelling of 70 wt% or less.